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| 10/615,554      | 07/07/2003  | Elizabeth Ann Dobisz | HSJ9-2003-0007US1   | 9002             |

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10/24/2005

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EXAMINER

CHEN, TIANJIE

ART UNIT

PAPER NUMBER

2652

DATE MAILED: 10/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/615,554

Applicant(s)

DOBISZ ET AL.

Examiner

Tianjie Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08/31/2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

By

## ***Final Rejection***

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 1-22 are rejected less than 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 10 recite: "said barrier layer is disposed only upon said central portion of said bias layer and upon said electrical leads" and claim 19 recites: "removing portion of said barrier layer that are disposed at locations other than upon said electrical leads and said central portions of said bias layer."

However, Applicant discloses in specification, pp. 9-10: "Fig. 4 is a cross sectional view of the magnetic head 16 of the present invention as depicted in Fig. 3 with the improvements next described. As depicted in Fig. 4, following the oxidation step described hereabove, in which the central portion 128 of the bias layer is oxidized, a thin barrier layer 170 is deposited across the surface of the wafer such as by using a sputter deposition process," and "Fig. 4, shows that the barrier layer 170 as deposited on top of the electrical leads. Significantly, the barrier layer 170 has been removed in the area 184 between the electrical leads 118, whereas the central barrier layer portion 178 is retained on top of the oxidized portion 128 of the bias layer 96."

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It shows that the barrier layer is disposed at wafer stage, it means that the barrier layer is disposed all area of the magnetic head and the space among them; i.e. the barrier layer is disposed not only on the central portion of the bias layer, the electrical lead, and the area between the leads. It includes other areas other than these three areas. Applicant only removes the barrier layer at the region between the electrical leads. Applicant has not removed "portions of said barrier area that are deposited at locations other than upon said electrical leads and upon central portions of said bias layer." And Applicant does not possess the feature of: "said barrier layer is disposed only upon said central portion of said bias layer and upon said electrical leads" It constitutes new matter.

The rest claims are rejected for their dependence from claims 1, 10, and 19; respectively.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill et al (US 2004/0090718) in view of Soeya et al (US 5,668,685).

Claims 1 and 10, Gill et al shows a hard disk drive including a magnetic head including a read head element in Fig.5, including: a pinned magnetic layer 512 ([0035], line 12); a free magnetic layer 516 having a central portion 536 thereof having

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a free magnetization; a magnetic bias layer 522 ([0036], line 1), including a central portion 538 thereof that is disposed across the central portion of the free magnetic layer; the central portion of the bias layer being comprised of a material having an approximately zero magnetic moment ([0037], lines 8-13); a pair of electrical leads 528 and 530 being disposed above the bias layer on opposite sides of the central portion of the bias layer; a barrier layer 540([0043], lines 16-19) being disposed across the central portion of the bias layer; and shows in ABS plane the barrier layer 540 is disposed only upon the central portion 538 of the bias layer the electrical leads 528 and 530.

Claim 19, as described above, Gill et al shows a method for fabricating a magnetic head, including: fabricating a free magnetic layer; fabricating a magnetic bias layer across the free magnetic layer; fabricating electrical leads 528 and 530 above portions of the bias layer; oxidizing a central portion of the bias layer; depositing an oxygen diffusion barrier layer upon the oxidized central portion of the bias layer.

Gill does not show the structure in depth direction; therefore, Gill is silent on whether the barrier layer is disposed between the electrical leads or not/or is there a step of removing the barrier layer from the area between electrical leads or not.

Soeya et al shows a magnetic head in Fig. 1A; wherein the barrier layer 70 (Column 8, line 30) is not disposed in the area between the electrical leads 60 (Fig. 1)/ or a step of removing the barrier layer from the area between electrical leads and teaches his structure is for improving recording density (Column 1, line 55-59). Since Gill does not show the structure in depth direction, one of ordinary skill in the art would have been looking for the structure in depth direction. Soeya et al shows a structure in depth and can provide higher recording density. One of ordinary skill in

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the art would have been motivated to use Soeya et al's structure for obtaining higher recording density.

Claims 2 and 11, Gill et al further shows that the central portion of the bias layer is comprised of an oxidized material ([0043], lines 16-19), and the barrier layer is comprised of a material Rh or Ru, which is inherently a barrier to oxygen diffusion from the central portion of the bias layer ([0043].

Claims 3 and 12, Gill et al shows a thin spacer layer 523 that is disposed upon the free magnetic layer 521, wherein the bias layer 522 is disposed upon the thin spacer layer 523 and the barrier layer 540 is deposited upon the bias layer.

Claims 4 and 13, Gill et al further shows that the barrier layer is comprised of a material that has low electrical conductivity.

Claims 5, 14, and 20; Gill et al further shows that the barrier layer 540 is comprised of Ru or Rh ([0043], lines 13-15).

Claims 6, 7, 15, 16, 21, and 22; Gill et al further shows that the barrier layer has a thickness of approximately 20 Å ([0042], lines 31-33)..

Claims 8 and 17, Gill et al further shows that the thin spacer layer is comprised of a material that is a barrier to oxygen diffusion.

Claims 9 and 18, Gill et al further shows that the thin spacer layer is comprised of Ru ([0042], lines 23-24).

3. Claims 1- 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horng et al (US 2003/0179517) in view of Redon et al (US 6,381,107) and Soeya et al.

Claims 1 and 10, Horng et al shows a hard disk drive including a magnetic head including a read head element in Fig. 3b, including: a pinned magnetic layer 30

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([0034]); a free magnetic layer 27 having a central portion 10 thereof having a free magnetization; a magnetic bias layer 25, including a central portion thereof that is disposed across the central portion of the free magnetic layer; the central portion of the bias layer being comprised of a material having an approximately zero magnetic moment ([0038] lines 10-14).

Horng et al does not show a barrier layer being disposed across the central portion of the bias layer.

Redon et al shows a magnetic head in Fig. 5 having a barrier layer 75 across the central portion of the bias layer, and made of Rh or Ru (Column 5, lines 51-53).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to add the barrier layer 75 into Horng et al's device. The rationale is as follows: Horng teaches a magnetic head with the core portion. It is obvious it has to be sealed for using in a apparatus. Redon et al teaches to add the gap layer 71 and 75 for protecting the core, which is common practice in the art. Redon et al further teaches that the layer 75 can be used for adjusting the distance between the shields (Column 5, lines 53-54). One of ordinary skill in the art would have been motivated to add the barrier layer into Horng et al's device for protecting and adjusting the distance between the shields.

Horng et al and Redon et al do not show the structure in depth direction; therefore, Horng et al and Redon et al are silent on whether the barrier layer is disposed between the electrical leads or not/or is there a step of removing the barrier layer from the area between electrical leads or not.

Soeya et al shows a magnetic head in Fig. 1A; wherein the barrier layer 70 (Column 8, line 30) is disposed in the area between electrical leads and teaches his

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structure is for improving recording density (Column 1, line 55-59). Since Horng et al and Redon et al do not show the structure in depth direction, one of ordinary skill in the art would have been looking for the structure in depth direction. Soeya et al shows a structure in depth and can provide higher recording density. One of ordinary skill in the art would have been motivated to use Soeya et al's structure for obtaining higher recording density.

Claim 19, the combination of Horng et al, Redon et al, and Soeya et al's device includes a method for fabricating a magnetic head, including: fabricating a free magnetic layer; fabricating a magnetic bias layer across the free magnetic layer; oxidizing a central portion of the bias layer; depositing an oxygen diffusion barrier layer upon the oxidized central portion of the bias layer and a step of removing the barrier layer from the area between electrical leads.

Claims 2 and 11, Horng et al further shows that the central portion of the bias layer is comprised of an oxidized material CoFeO ([0038], line 11-13), and the barrier layer is comprised of a material Ru or Rh, which is inherently a barrier to oxygen diffusion from the central portion of the bias layer.

Claims 3 and 12, Horng et al further shows that the magnetic head includes a thin spacer layer 28 that is disposed upon the free magnetic layer, wherein the bias layer is disposed upon the thin spacer layer; in Horng et al and Redon et al's device, the barrier layer is deposited upon the bias layer.

Claims 4 and 13, Redon et al shows that the barrier layer is comprised of a Ru or Rh, which has low electrical conductivity.

Claims 5, 14, and 20; Redon et al shows that the barrier layer is comprised of Ru or Rh.

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Claims 6, 15, and 21; Redon et al further shows the barrier layer is comprised of Ru having a thickness of 50 Å (Column 4, line 61-62), which is approximately 40.

Claims 7, 16, and 22; Redon et al shows that the thickness is adjustable (Column 5, lines 53-54). Applicant does not disclose any unexpected result for choosing 20 Å over 50 Å. One of ordinary skill in the art would be able to determine the thickness through experimentation, which would includes the thickness of 20 Å.

Claims 8, 9, 17, and 18; Horng et al shows that the thin spacer layer 28 is comprised of a Ru ([0030]) that is a barrier to oxygen diffusion. thereof that is disposed across the

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

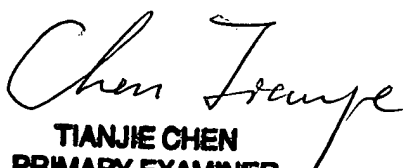
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is 571-272-7570. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on 571-272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
**TIANJIE CHEN**  
**PRIMARY EXAMINER**